

**AMENDMENTS TO THE DRAWINGS**

FIG. 7B is amended to correct a the word “COUN” to “COUNT” in the block below the  
"YES" branch.

Attachment: 1 Replacement sheet.

**REMARKS**

**Status of the Application**

Claims 14-25 are pending in the application and have been examined.

**Formal Matters**

Applicant thanks the Examiner for considering the references submitted with the Information Disclosure Statements filed on July 11, 2006, and June 6, 2008.

**Objections to the Drawings**

The Examiner objects to the drawings because FIG. 7B contains a typographical error.

Applicant respectfully submits that amendments to FIG. 7B overcome this objection and respectfully requests that this objection be withdrawn.

**Claim Rejections**

***Claims 14-25 — 35 U.S.C. § 112, second paragraph***

Claims 14-21 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements resulting in a gap between the necessary structural connections. Specifically, claims 14, 17, and 20 recite an electric-discharge generation counter for counting in response to the waveform an electric-discharge generation count  $N_d$  during the predetermined sampling time  $T_s$  without associating the electric-discharge generation counter with the claimed structure.

Claims 14, 17, and 22 are amended to clarify that the electric-discharge generation counter counts in response to the waveform "detected by the electric-discharge detection circuit" in order to associate the electric-discharge generation counter with the apparatus structure.

Applicant respectfully submits that the amendments to claims 14, 17, and 22 overcome this rejection and respectfully requests that this rejection be withdrawn.

Also, the Examiner alleges that claims 15, 16, 18, 19, and 21 merely recite mathematical formulas and functional limitations but do not add any structure to the apparatus. Applicant respectfully traverses this rejection.

Applicant submits that claim 15 recites the structural element "a short-circuit generation counter." As the Examiner is aware, functional claim limitations are not improper: "[t]here is nothing inherently wrong with defining some part of an invention in functional terms. ... A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used." See MPEP § 2173.05(g).

Thus, Applicant respectfully submits that claims 15, 16, 18, 19, and 21 are of proper form and respectfully requests that this rejection be withdrawn.

In addition, the Examiner alleges that claims 15-21 do not recite an element for controlling a machining axis so that  $V_g$  agrees with  $SV$ . Applicant respectfully traverses this rejection.

Claims 15 and 16 depend from independent claim 14 and incorporate its features of "an electrode-position controller for controlling the machining axis so that the estimation average voltage  $V_{gs}$  calculated by the calculator agrees with the servo standard voltage  $SV$  during the sampling time  $T_s$ ." Therefore claims 15 and 16 **do recite** the allegedly missing element. Similarly, claim 17 from which claims 18 and 19 depend recites the same features, as does claim 20 from which claim 21 depends.

Accordingly, Applicant respectfully submits that the rejection is in error and respectfully requests that this rejection be withdrawn.

Further, the Examiner rejects claims 22-25 under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps amounting to a gap between the steps. Specifically, the Examiner alleges that the omitted steps are that claims 22-25 do not recite active steps for determining all of the recited variables, and do not recite a step where  $V_g$  agrees with  $SV$ . Applicant respectfully traverses this rejection.

Applicant respectfully submits that definitions of the variables are recited in the claim language. Further, the specification explains that the recited variables are well known to those of skill in the electric discharge machining art and also provides additional clarification of the variables. See, for example, page 6, line 18 – page 7, line 22. Further, Applicant notes that the last clause of both independent claims 22 and 25 recite the features of "a step of controlling the machining axis so that the estimation average voltage  $V_{gs}$  calculated agrees with the servo standard voltage  $SV$  within the sampling time  $T_s$ ," and thus the claims recite a step where  $V_g$  agrees with  $SV$ .

Accordingly, Applicant respectfully submits that the rejection is in error and respectfully requests that this rejection be withdrawn.

Finally, the Examiner alleges that the first recital of "the waveform" in claims 14, 17, 20, 22, and 25 lacks sufficient antecedent basis.

Applicant respectfully submits that the amendments to claims 14, 17, 20, 22, and 25 overcome this rejection and respectfully requests that this rejection be withdrawn.

***Claims 14-25 — 35 U.S.C. § 103(a)***

Claims 14-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,598,075 to Liang et al. ("Liang"). Applicant respectfully traverses this rejection.

Applicant respectfully submits that the method of determining the estimation average voltage for effecting servo control recited in claims 14-25 is different than the method disclosed by Liang based at least on the variables and parameters considered in the determination. The disclosure of Liang does not suggest a calculation other than a simple average voltage calculation.

Liang discloses a method and apparatus for electric discharge machining using servo control to quickly remove a discharge electrode from a workpiece when a short circuit condition is detected (Abstract). As disclosed by the reference, a discharge detection circuit 8 and a short-circuit detection circuit 9 monitor a voltage between the electrode and the workpiece to detect and count normal and abnormal discharges (col. 3, ll. 21-36). An estimation average voltage used for servo control is calculated from the voltage signal obtained from the voltage between the electrode and the workpiece (col. 3, ll. 37-64; FIG. 4).

The Examiner alleges that it would have been obvious to one of ordinary skill in the art at the time of invention to derive equations for calculating an estimation average voltage  $V_{gs}$  based on a variety of equations, circuits and variables disclosed in Liang. Applicant respectfully submits that the Examiner provides no support for his conclusion. Applicant further respectfully submits that if it would have been obvious to one of ordinary skill in the art, then Liang would disclose calculating estimation average voltages based on all of the variables recited in the claims, and in the manner recited.

In addition, Applicant submits with regard to the Examiner's reference to MPEP 2106.02 that the claims do not merely recite a mathematical formula, but instead recite a method of determining an estimation average voltage for controlling the machining axis based on electric discharge machining parameters and variables which is not disclosed or suggested by Liang.

In view of the above, Applicant respectfully submits that Liang fails to disclose or suggest all of the claimed features. Accordingly, claims 14-25 are patentable over Liang.

### **Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Francis G. Plati, Sr.  
Registration No. 59,153

SUGHRUE MION, PLLC  
Telephone: (202) 293-7060  
Facsimile: (202) 293-7860

WASHINGTON OFFICE

**23373**

CUSTOMER NUMBER

Date: December 16, 2011